

1 **CLAIMS**

2

3 1. One or more computer-readable media having stored thereon a
4 plurality of instructions that, when executed by one or more processors of a
5 computer, causes the one or more processors to perform the following acts:

6 receiving search criteria;

7 generating a query vector based on text features of the search criteria;

8 identifying media content pieces to be rendered by comparing the query
9 vector to text feature vectors associated with a plurality of media content pieces;

10 receiving user feedback regarding the relevancy of the identified media
11 content pieces;

12 modifying the query vector based on the user feedback;

13 modifying one or more of the text feature vectors associated with the
14 plurality of media content pieces based on the user feedback; and

15 identifying new media content pieces to be rendered by comparing the
16 modified query vector to the text feature vectors, including the one or more
17 modified text feature vectors, associated with the plurality of media content
18 pieces.

19

20 2. One or more computer readable media as recited in claim 1, further
21 comprising:

22 generating another query vector based on one or more low-level features of
23 the search criteria; and

24 wherein the identifying comprises,

1 comparing the query vector to text feature vectors associated with
2 the plurality of media content pieces to generate first results,

3 comparing the other query vector to other low-level feature vectors
4 associated with the plurality of media content pieces to generate second
5 results, and

6 combining, for one of the plurality of media content pieces, the first
7 and second results corresponding to the one media content piece.

8
9 **3.** One or more computer readable media as recited in claim 2, further
10 comprising altering, based on the user feedback, a weighting of the results used in
11 the combining.

12
13 **4.** One or more computer readable media as recited in claim 3, wherein
14 the altering comprises:

15 determining, for the one of the plurality of media content pieces, whether
16 the first result corresponding to the one media content piece is greater than the
17 second result corresponding to the one media content piece; and

18 weighting the first result corresponding to the one media content piece
19 more heavily if the first result corresponding to the one media content piece is less
20 than the second result corresponding to the one media content piece, and otherwise
21 weighting the second result corresponding to the one media content piece more
22 heavily.

1 5. One or more computer readable media as recited in claim 1, wherein
2 modifying one or more of the text feature vectors associated with the plurality of
3 media content pieces based on the user feedback comprises altering a weighting of
4 one or more elements in the feature vector based on the user feedback.

5
6 6. One or more computer readable media as recited in claim 1, wherein
7 the search criteria comprises one or more words.

8
9 7. One or more computer readable media as recited in claim 1, wherein
10 the piece of media content comprises an image.

11
12 8. One or more computer readable media as recited in claim 1, wherein
13 the piece of media content comprises a portion of audio content.

14
15 9. One or more computer readable media as recited in claim 1, wherein
16 the piece of media content comprises a portion of multimedia content.

17
18 10. A method comprising:
19 identifying a media content source;
20 collecting one or more pieces of media content and associated text from the
21 media content source;
22 extracting, for a piece of media content, one or more text features from the
23 associated text; and
24 making the one or more text features available for searching.

1 **11.** A method as recited in claim 10, further comprising:
2 generating one or more text feature vectors from the extracted one or more
3 text features; and

4 wherein the making comprises making the one or more text feature vectors
5 available for searching.

6
7 **12.** A method as recited in claim 10, further comprising:
8 extracting one or more low-level features from the media content piece; and
9 making the one or more low-level features available for searching.

10
11 **13.** A method as recited in claim 10, further comprising, for each
12 collected piece of media content:

13 classifying the image as meaningful or not meaningful; and
14 wherein the extracting comprises extracting the one or more text features
15 for the piece of media content only if the piece of media content is classified as
16 meaningful.

17
18 **14.** A method as recited in claim 10, wherein the media content source
19 comprises a web site including a plurality of web pages, each web page including
20 a plurality of pieces of media content and text associated with one or more of the
21 plurality of pieces of media content.

1 **15.** A method as recited in claim 10, wherein the associated text for a
2 piece of media content comprises a filename and the one or more text features
3 comprises one or more words in the filename.

4

5 **16.** A method as recited in claim 10, wherein the associated text for a
6 piece of media content comprises a uniform resource locator (URL) and the one or
7 more text features comprises one or more words in the URL.

8

9 **17.** A method as recited in claim 10, wherein the associated text for a
10 piece of media content comprises alternate text that can be displayed in place of
11 the media content, and the one or more text features comprises one or more words
12 of the alternate text.

13

14 **18.** A method as recited in claim 10, wherein the associated text for a
15 piece of media content comprises text surrounding the piece of media content on a
16 web page, and the one or more text features comprises one or more words of the
17 text surrounding the piece of media content.

18

19 **19.** A method as recited in claim 10, wherein the associated text for a
20 piece of media content comprises a title of a web page that includes the piece of
21 media content, and the one or more text features comprises one or more words in
22 the title.

1 **20.** A method as recited in claim 10, wherein the associated text for a
2 piece of media content comprises a link on a web page that includes the piece of
3 media content, and the one or more text features comprises one or more words in
4 the link.

5
6 **21.** A method as recited in claim 10, wherein the associated text for a
7 piece of media content comprises anchor text corresponding to the piece of media
8 content, and the one or more text features comprises one or more words in the
9 anchor text.

10
11 **22.** A method as recited in claim 10, wherein the associated text for a
12 piece of media content comprises an image annotation corresponding to the piece
13 of media content, and the one or more text features comprises one or more words
14 in the image annotation.

15
16 **23.** A method as recited in claim 10, wherein each of the one or more
17 pieces of media content comprises an image.

18
19 **24.** A method as recited in claim 10, wherein each of the one or more
20 pieces of media content comprises a piece of audio content.

21
22 **25.** A method as recited in claim 10, wherein each of the one or more
23 pieces of media content comprises a piece of multimedia content.

1 **26.** One or more computer-readable memories containing a computer
2 program that is executable by a processor to perform the method recited in claim
3 10.
4

5 **27.** A method comprising:
6 receiving search criteria;
7 generating a query vector based on the search criteria;
8 comparing the query vector to a feature vector corresponding to a piece of
9 media content and having been generated based on text associated with the piece
10 of media content; and
11 determining, based at least in part on a result of the comparing, whether to
12 render the piece of media content to a user.

13
14 **28.** A method as recited in claim 27, further comprising:
15 rendering a plurality of pieces of media content to the user;
16 receiving feedback from the user regarding one or more of the plurality of
17 pieces of media content;
18 modifying the query vector based on the feedback; and
19 repeating the comparing and determining based on the modified query
20 vector.

21
22 **29.** A method as recited in claim 27, further comprising:
23 generating another query vector based on one or more low-level features of
24 the search criteria;

1 comparing the other query vector to another feature vector corresponding to
2 the piece of media content and having been generated based on the one or more
3 low-level features of the piece of media content;

4 combining a result of the other query vector to the other feature vector with
5 the result of comparing the query vector to the feature vector; and

6 wherein the determining comprises determining, based at least in part on
7 the combined result, whether to render the piece of media content to the user.

8

9 **30.** A method as recited in claim 29, further comprising:

10 accessing user feedback regarding the relevancy of one or more pieces of
11 media content rendered to the user; and

12 altering, based on the user feedback, a weighting of the results during the
13 combining.

14

15 **31.** A method as recited in claim 30, wherein the altering comprises:

16 determining whether a first distance between the other query vector and the
17 other feature vector is greater than a second distance between the query vector and
18 the feature vector; and

19 weighting the result of the comparing the other query vector to the other
20 feature vector more heavily if the first distance is less than the second distance,
21 and otherwise weighting the result of the comparing the query vector to the feature
22 vector more heavily.

1 **32.** A method as recited in claim 27, further comprising:
2 accessing user feedback regarding the relevancy of one or more pieces of
3 media content rendered to the user; and
4 modifying the feature vector corresponding to the piece of media content
5 based on the user feedback.

6
7 **33.** A method as recited in claim 32, further comprising:
8 generating a user space vector corresponding to each of the one or more
9 pieces of media content for which user feedback is accessed; and
10 using the user space vector corresponding to a particular piece of media
11 content to modify the feature vector corresponding to the particular piece of media
12 content.

13
14 **34.** A method as recited in claim 27, further comprising:
15 accessing user feedback regarding the relevancy of one or more pieces of
16 media content rendered to the user; and
17 altering a weighting of one or more elements in the feature vector based on
18 the user feedback.

19
20 **35.** A method as recited in claim 27, wherein the search criteria
21 comprises one or more words.

22
23 **36.** A method as recited in claim 27, wherein the piece of media content
24 comprises an image.

1 **37.** A method as recited in claim 27, wherein the piece of media content
2 comprises a piece of audio content.

3

4 **38.** A method as recited in claim 27, wherein the piece of media content
5 comprises a piece of multimedia content.

6

7 **39.** One or more computer-readable memories containing a computer
8 program that is executable by a processor to perform the method recited in claim
9 27.

10

11 **40.** A system comprising:
12 a crawler module coupled to access a media content source and collect a
13 plurality of media content pieces and associated text from the media content
14 source;
15 a feature extraction module coupled to extract one or more text features
16 from one of the media content pieces; and
17 a media content indexing module coupled to generate a text feature vector,
18 based on the extracted one or more text features, corresponding to the one media
19 content piece.

20

21 **41.** A system comprising:
22 a query generator to generate a query vector based on received search
23 criteria; and
24 a matching module coupled to,

receive the query vector and compare the query vector to a plurality of feature vectors corresponding to a plurality of pieces of media content, wherein each of the plurality of feature vectors has been generated based on text associated with one of the plurality of pieces of media content, and

identify one or more of the plurality of pieces of media content to return for rendering to a user based on the comparison of the query vector to the plurality of feature vectors.

42. A method comprising:

receiving search criteria;

identifying, based at least in part on the search criteria, a piece of media content to be rendered;

receiving user feedback regarding the relevancy of the rendered piece of media content;

weighting for another piece of media content, based on the user feedback, both a result of comparing the high-level query vector to a high-level feature vector of the other piece of media content and a result of comparing the low-level query vector to a low-level feature vector of the other piece of media content; and

combining the weighted result to determine whether to identify the other piece of media content for rendering.

43. A method as recited in claim 42, further comprising generating a new high-level query vector and a new low-level query vector based at least in part on the search criteria.

1 **44.** A method as recited in claim 42, further comprising:
2 generating a user space vector corresponding to the piece of media content;

3 and

4 using the user space vector corresponding to the piece of media content to
5 modify the high-level feature vector corresponding to the piece of media content.

6
7 **45.** A method as recited in claim 42, further comprising altering a
8 weighting of one or more elements in the feature vector based on the user
9 feedback.

10
11 **46.** A method as recited in claim 42, wherein the high-level feature
12 vector of the other piece of media content is a text feature vector.

13
14 **47.** One or more computer-readable memories containing a computer
15 program that is executable by a processor to perform the method recited in claim
16 42.

17
18 **48.** A method comprising:
19 receiving user feedback regarding the relevancy of one or more pieces of
20 rendered media content; and
21 for each of the one or more pieces of media content,
22 modifying, based on the user feedback, a feature vector
23 corresponding to the piece of media content, and
24 making the modified feature vector available for subsequent
25 searching of the one or more pieces of media content.

1
2 **49.** A method as recited in claim 48, wherein the feature vector is a text
3 feature vector.
4

5 **50.** One or more computer-readable memories containing a computer
6 program that is executable by a processor to perform the method recited in claim
7 48.
8

9 **51.** One or more computer-readable media having stored thereon a
10 plurality of instructions that, when executed by one or more processors of a
11 computer, causes the one or more processors to perform acts including:
12

13 identifying a piece of media content to render to a user based at least in part
14 on comparing a query vector corresponding to search criteria of the user and a
feature vector corresponding to the piece of media content;
15

16 receiving user feedback regarding the relevancy of the piece of media
content;
17

18 modifying the query vector based on the received user feedback; and
19

20 modifying the feature vector based on the received user feedback in an off-
line log mining process.
21

22 **52.** One or more computer-readable media as recited in claim 51,
23 wherein modifying the query vector comprises generating a vector U based on
pieces of media content identified as relevant in the user feedback, and generating
24 a new query vector D_{new} according to the following:
25

$$D_{new} = \eta U + (1 - \eta)D$$

1 where η represents a confidence in the vector U .

2
3 **53.** One or more computer-readable media as recited in claim 52,
4 wherein modifying the query vector comprises generating a vector V based on
5 pieces of media content identified as irrelevant in the user feedback, and
6 generating a new query vector D_{final} according to the following:

7
$$D_{final} = D_{new} * (1 - V).$$

8
9 **54.** One or more computer-readable media as recited in claim 51,
10 wherein the piece of media content comprises one of: audio content, visual
11 content, and multimedia content.